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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

November 5, 1990

Docket Nos. 50-259, 50-260
and 50-296

Posted
Amdt. 179 to DPR-52

Mr. Oliver D. Kingsley, Jr.
Senior Vice President, Nuclear Power
Tennessee Valley Authority
6N 38A Lookout Place
1101 Market Street
Chattanooga, Tennessee 37402-2801

Dear Mr. Kingsley:

SUBJECT: TECHNICAL SPECIFICATION CHANGES INVOLVING REQUIREMENTS FOR THE RESIDUAL HEAT REMOVAL SERVICE WATER AND EMERGENCY EQUIPMENT COOLING WATER SYSTEMS (TAC NOS. 76839, 76840, AND 76841) (TS 242) BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2, AND 3

The Commission has issued the enclosed Amendment Nos. 176, 179, and 147 to Facility Operating Licenses Nos. DPR-33, DPR-52 and DPR-68 for the Browns Ferry Nuclear Plant, Units 1, 2 and 3, respectively. These amendments are in response to your application dated May 18, 1990, which requested revisions to the Technical Specifications to clarify the Limiting Conditions for Operation of the Residual Heat Removal Service Water (RHRSW) and Emergency Equipment Cooling Water (EECW) systems.

A copy of the Safety Evaluation is also enclosed. Notice of Issuance will be included in the Commission's bi-weekly Federal Register notice.

Sincerely,

Thierry M. Ross

Thierry M. Ross, Project Manager
Project Directorate II-4
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 176 to License No. DPR-33
2. Amendment No. 179 to License No. DPR-52
3. Amendment No. 147 to License No. DPR-68
4. Safety Evaluation

cc w/enclosures:
See next page

cc:
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-259

BROWNS FERRY NUCLEAR PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 176
License No. DPR-33

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Tennessee Valley Authority (the licensee) dated May 18, 1990, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of Facility Operating License No. DPR-33 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 176, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Frederick J. Hebdon, Director
Project Directorate II-4
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: November 5, 1990

ATTACHMENT TO LICENSE AMENDMENT NO. 176

FACILITY OPERATING LICENSE NO. DPR-33

DOCKET NO. 50-259

Revise the Appendix A Technical Specifications by removing the pages identified below and inserting the enclosed pages. The revised pages are identified by the captioned amendment number and contain marginal lines indicating the area of change. Overleaf pages* are provided to maintain document completeness.

REMOVE	INSERT
3.5/4.5-9	3.5/4.5-9
3.5/4.5-10	3.5/4.5-10*
3.5/4.5-11	3.5/4.5-11
3.5/4.5-11a	3.5/4.5-11a*
3.5/4.5-28	3.5/4.5-28
3.5/4.5-29	3.5/4.5-29

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.5.C RHR Service Water and Emergency Equipment Cooling Water Systems (EECWS) 1. PRIOR TO STARTUP from a COLD SHUTDOWN CONDITION, the RHRSW pumps, including pump D1 or D2, shall be OPERABLE and assigned to service as indicated in Table 3.5-1.	4.5.C RHR Service Water and Emergency Equipment Cooling Water Systems (EECWS) 1. a. Each of the RHRSW pumps normally assigned to automatic service on the EECW headers will be tested automatically each time the diesel generators are tested. Each of the RHRSW pumps and all associated essential control valves for the EECW headers and RHR heat exchanger headers shall be demonstrated to be OPERABLE in accordance with Specification 1.0.MM. b. Annually each RHRSW pump shall be flow-rate tested. To be considered OPERABLE, each pump shall pump at least 4500 gpm through its normally assigned flow path. c. Monthly verify that each valve (manual, power-operated, or automatic) in the flowpath servicing safety-related equipment in the affected unit that is not locked, sealed, or otherwise secured in position, is in its correct position.

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.5.C RHR Service Water and Emergency Equipment Cooling Water Systems (EECWS) (Continued)	4.5.C RHR Service Water and Emergency Equipment Cooling Water Systems (EECWS) (Continued)
2. During REACTOR POWER OPERATION, RHRSW pumps must be OPERABLE and assigned to service as indicated in Table 3.5-1 for the specified time limits.	2. No additional surveillance is required.
3. During REACTOR POWER OPERATION, both RHRSW pumps D1 and D2 normally or alternately assigned to the RHR heat exchanger header supplying the standby coolant supply connection must be OPERABLE except as specified in 3.5.C.4 and 3.5.C.5 below.	3. Routine surveillance for these pumps is specified in 4.5.C.1.

AMENDMENT NO. 169, 176

Table 3.5-1

Minimum RHRSW and EECW Pump Assignment

Time Limit	1 Unit Fueled (2 Units Defueled)			2 Units Fueled (1 Unit Defueled)			3 Units Fueled		
	RHRSW		EECW(A)	RHRSW		EECW(A)	RHRSW		EECW(A)
None	4	and	3	5	and	3	7	and	3
30 Days	3	and	2	5 (or) 4	and and	2 3	7 (or) 6	and and	2 3
7 Days	2	and	2	4	and	2	6	and	2

Note:

(A) At least one OPERABLE pump must be assigned to each header. Only automatically starting pumps may be assigned to EECW header service.

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The suppression chamber can be drained when the reactor vessel pressure is atmospheric, irradiated fuel is in the reactor vessel, and work is not in progress which has the potential to drain the vessel. By requiring the fuel pool gate to be open with the vessel head removed, the combined water inventory in the fuel pool, the reactor cavity, and the separator/dryer pool, between the fuel pool low level alarm and the reactor vessel flange, is about 65,800 cubic feet (492,000 gallons). This will provide adequate low-pressure cooling in lieu of CSS and RHR (LPCI and containment cooling mode) as currently required in Specifications 3.5.A.4 and 3.5.B.9. The additional requirements for providing standby coolant supply available will ensure a redundant supply of coolant supply. Control rod drive maintenance may continue during this period provided no more than one drive is removed at a time unless blind flanges are installed during the period of time CRDs are not in place.

Should the capability for providing flow through the cross-connect lines be lost, a 10-day repair time is allowed before shutdown is required. This repair time is justified based on the very small probability for ever needing RHR pumps and heat exchangers to supply an adjacent unit.

REFERENCES

1. Residual Heat Removal System (BFNP FSAR subsection 4.8)

2. Core Standby Cooling Systems (BFNP FSAR Section 6)

3.5.C. RHR Service Water System and Emergency Equipment Cooling Water System (EECWS)

The EECW has two completely redundant and independent headers (north and south) in a loop arrangement inside and outside the Reactor Building. Four RHRSW pumps, two per header, (A3, B3, C3 and D3) are dedicated to automatically supplying the EECW system needs. Four additional pumps (A1, B1, C1 and D1) can serve as RHRSW system pumps or be manually valved into the EECW system headers and serve as backup for the RHRSW pumps dedicated to supplying the EECW system. Those components requiring EECW, except the control air compressors which are not safety related, are able to be fed from both headers thus assuring continuity of operation if either header becomes inoperable. The control air compressors only use the EECW north header as an emergency backup supply.

There are four RHR heat exchanger headers (A, B, C, & D) with one RHR heat exchanger from each unit on each header. There are two RHRSW pumps on each header; one normally assigned to each header (A2, B2, C2, or D2) and one on alternate assignment (A1, B1, C1, or D1). One RHR heat exchanger header can adequately deliver the flow supplied by both RHRSW pumps to any two of the three RHR heat exchangers on the header. One RHRSW pump can supply the full flow requirement of one RHR heat exchanger. Two RHR heat exchangers can more than adequately handle the cooling requirements of one unit in any abnormal or postaccident situation.

The RHR Service Water System was designed as a shared system for three units. The specification, as written, is conservative when consideration is given to particular pumps being out of service and to possible valving arrangements. If unusual operating conditions arise such that more pumps are out of service than allowed by this specification, a special case request may be made to the NRC to allow continued operation if the actual system cooling requirements can be assured.

Should one of the two RHRSW pumps normally or alternately assigned to the RHR heat exchanger header supplying the standby coolant supply connection become inoperable, an equal capability for long-term fluid makeup to the unit reactor and for cooling of the unit containment remains OPERABLE. Because of the availability of an equal makeup and cooling capability, a 30-day repair period is justified. Should the capability to provide standby coolant supply be lost, a 10-day repair time is justified based on the low probability for ever needing the standby coolant supply. Verification that the LPCI subsystem cross-tie valve is closed and power to its operator is disconnected ensures that each LPCI subsystem remains independent and a failure of the flow path in one subsystem will not affect the flow path of the other LPCI subsystem.

With only one unit fueled, four RHRSW pumps are required to be OPERABLE for indefinite operation to meet the requirements of Specification 3.5.B.1 (RHR system). If only three RHRSW pumps are OPERABLE, a 30-day LCO exists because of the requirement of Specification 3.5.B.5 (RHR system).

3.5.D Equipment Area Coolers

There is an equipment area cooler for each RHR pump and an equipment area cooler for each set (two pumps, either the A and C or B and D pumps) of core spray pumps. The equipment area coolers take suction near the cooling air discharge of the motor of the pump(s) served and discharge air near the cooling air suction of the motor of the pump(s) served. This ensures that cool air is supplied for cooling the pump motors.

The equipment area coolers also remove the pump, and equipment waste heat from the basement rooms housing the engineered safeguard equipment. The various conditions under which the operation of the equipment air coolers is required have been identified by evaluating the normal and abnormal operating transients and accidents over the full range of planned operations. The surveillance and testing of the equipment area coolers in each of their various modes is accomplished during the testing of the equipment served by these coolers. This testing is adequate to assure the OPERABILITY of the equipment area coolers.

REFERENCES

1. Residual Heat Removal System (BFN FSAR Section 4.8)

2. Core Standby Cooling System (BFN FSAR subsection 6.7)

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-260

BROWNS FERRY NUCLEAR PLANT, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 179
License No. DPR-52

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Tennessee Valley Authority (the licensee) dated May 18, 1990, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of Facility Operating License No. DPR-52 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 179, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Frederick J. Hebdon, Director
Project Directorate II-4
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: November 5, 1990

ATTACHMENT TO LICENSE AMENDMENT NO. 179

FACILITY OPERATING LICENSE NO. DPR-52

DOCKET NO. 50-260

Revise the Appendix A Technical Specifications by removing the pages identified below and inserting the enclosed pages. The revised pages are identified by the captioned amendment number and contain marginal lines indicating the area of change. Overleaf pages* are provided to maintain document completeness.

REMOVE	INSERT
3.5/4.5-9	3.5/4.5-9
3.5/4.5-10	3.5/4.5-10*
3.5/4.5-11	3.5/4.5-11
3.5/4.5-11a	3.5/4.5-11a*
3.5/4.5-26	3.5/4.5-26
3.5/4.5-27	3.5/4.5-27

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.5.C RHR Service Water and Emergency Equipment Cooling Water Systems (EECWS) 1. PRIOR TO STARTUP from a COLD SHUTDOWN CONDITION, the RHRSW pumps, including one of pumps D1, D2, B2 or B1, shall be OPERABLE and assigned to service as indicated in Table 3.5-1.	4.5.C RHR Service Water and Emergency Equipment Cooling Water Systems (EECWS) 1. a. Each of the RHRSW pumps normally assigned to automatic service on the EECW headers will be tested automatically each time the diesel generators are tested. Each of the RHRSW pumps and all associated essential control valves for the EECW headers and RHR heat exchanger headers shall be demonstrated to be OPERABLE in accordance with Specification 1.0.MM. b. Annually each RHRSW pump shall be flow-rate tested. To be considered OPERABLE, each pump shall pump at least 4500 gpm through its normally assigned flow path. c. Monthly verify that each valve (manual, power-operated, or automatic) in the flowpath servicing safety-related equipment in the affected unit that is not locked, sealed, or otherwise secured in position, is in its correct position.

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.5.C RHR Service Water and Emergency Equipment Cooling Water Systems (EECWS) (Continued)	4.5.C RHR Service Water and Emergency Equipment Cooling Water Systems (EECWS) (Continued)
2. During REACTOR POWER OPERATION, RHRSW pumps must be OPERABLE and assigned to service as indicated in Table 3.5-1 for the specified time limits.	2. No additional surveillance is required.
3. During Unit 2 REACTOR POWER OPERATION, any two RHRSW pumps (D1, D2, B1, and B2) normally or alternately assigned to the RHR heat exchanger header supplying the standby coolant supply connection must be OPERABLE except as specified in 3.5.C.4 and 3.5.C.5 below.	3. Routine surveillance for these pumps is specified in 4.5.C.1.

Table 3.5-1

Minimum RHRSW and EECW Pump Assignment

Time Limit	1 Unit Fueled (2 Units Defueled)			2 Units Fueled (1 Unit Defueled)			3 Units Fueled		
	RHRSW		EECW(A)	RHRSW		EECW(A)	RHRSW		EECW(A)
None	4	and	3	5	and	3	7	and	3
30 Days	3	and	2	5 (or) 4	and and	2 3	7 (or) 6	and and	2 3
7 Days	2	and	2	4	and	2	6	and	2

Note:

(A) At least one OPERABLE pump must be assigned to each header. Only automatically starting pumps may be assigned to EECW header service.

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The suppression chamber can be drained when the reactor vessel pressure is atmospheric, irradiated fuel is in the reactor vessel, and work is not in progress which has the potential to drain the vessel. By requiring the fuel pool gate to be open with the vessel head removed, the combined water inventory in the fuel pool, the reactor cavity, and the separator/dryer pool, between the fuel pool low level alarm and the reactor vessel flange, is about 65,800 cubic feet (492,000 gallons). This will provide adequate low-pressure cooling in lieu of CSS and RHR (LPCI and containment cooling mode) as currently required in Specifications 3.5.A.4 and 3.5.B.9. The additional requirements for providing standby coolant supply available will ensure a redundant supply of coolant supply. Control rod drive maintenance may continue during this period provided no more than one drive is removed at a time unless blind flanges are installed during the period of time CRDs are not in place.

Should the capability for providing flow through the cross-connect lines be lost, a 10-day repair time is allowed before shutdown is required. This repair time is justified based on the very small probability for ever needing RHR pumps and heat exchangers to supply an adjacent unit.

REFERENCES

1. Residual Heat Removal System (BFNP FSAR subsection 4.8)

2. Core Standby Cooling Systems (BFNP FSAR Section 6)

3.5.C. RHR Service Water System and Emergency Equipment Cooling Water System (EECWS)

The EECW has two completely redundant and independent headers (north and south) in a loop arrangement inside and outside the Reactor Building. Four RHRSW pumps, two per header, (A3, B3, C3 and D3) are dedicated to automatically supplying the EECW system needs. Four additional pumps (A1, B1, C1 and D1) can serve as RHRSW system pumps or be manually valved into the EECW system headers and serve as backup for the RHRSW pumps dedicated to supplying the EECW system. Those components requiring EECW, except the control air compressors which are not safety related, are able to be fed from both headers thus assuring continuity of operation if either header becomes inoperable. The control air compressors only use the EECW north header as an emergency backup supply.

There are four RHR heat exchanger headers (A, B, C, & D) with one RHR heat exchanger from each unit on each header. There are two RHRSW pumps on each header; one normally assigned to each header (A2, B2, C2, or D2) and one on alternate assignment (A1, B1, C1, or D1). One RHR heat exchanger header can adequately deliver the flow supplied by both RHRSW pumps to any two of the three RHR heat exchangers on the header. One RHRSW pump can supply the full flow requirement of one RHR heat exchanger. Two RHR heat exchangers can more than adequately handle the cooling requirements of one unit in any abnormal or postaccident situation.

The RHR Service Water System was designed as a shared system for three units. The specification, as written, is conservative when consideration is given to particular pumps being out of service and to possible valving arrangements. If unusual operating conditions arise such that more pumps are out of service than allowed by this specification, a special case request may be made to the NRC to allow continued operation if the actual system cooling requirements can be assured.

Should one of the two RHRSW pumps normally or alternately assigned to the RHR heat exchanger header supplying the standby coolant supply connection become inoperable, an equal capability for long-term fluid makeup to the unit reactor and for cooling of the unit containment remains OPERABLE. Because of the availability of an equal makeup and cooling capability, a 30-day repair period is justified. Should the capability to provide standby coolant supply be lost, a 10-day repair time is justified based on the low probability for ever needing the standby coolant supply. Verification that the LPCI subsystem cross-tie valve is closed and power to its operator is disconnected ensures that each LPCI subsystem remains independent and a failure of the flow path in one subsystem will not affect the flow path of the other LPCI subsystem.

With only one unit fueled, four RHRSW pumps are required to be OPERABLE for indefinite operation to meet the requirements of Specification 3.5.B.1 (RHR system). If only three RHRSW pumps are OPERABLE, a 30-day LCO exists because of the requirement of Specification 3.5.B.5 (RHR system).

3.5.D Equipment Area Coolers

There is an equipment area cooler for each RHR pump and an equipment area cooler for each set (two pumps, either the A and C or B and D pumps) of core spray pumps. The equipment area coolers take suction near the cooling air discharge of the motor of the pump(s) served and discharge air near the cooling air suction of the motor of the pump(s) served. This ensures that cool air is supplied for cooling the pump motors.

The equipment area coolers also remove the pump, and equipment waste heat from the basement rooms housing the engineered safeguard equipment. The various conditions under which the operation of the equipment air coolers is required have been identified by evaluating the normal and abnormal operating transients and accidents over the full range of planned operations. The surveillance and testing of the equipment area coolers in each of their various modes is accomplished during the testing of the equipment served by these coolers. This testing is adequate to assure the OPERABILITY of the equipment area coolers.

REFERENCES

1. Residual Heat Removal System (BFN FSAR Section 4.8)

2. Core Standby Cooling System (BFN FSAR subsection 6.7)

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-296

BROWNS FERRY NUCLEAR PLANT, UNIT 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No.147
License No. DPR-68

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Tennessee Valley Authority (the licensee) dated May 18, 1990, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of Facility Operating License No. DPR-68 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 147, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Frederick J. Hebdon, Director
Project Directorate II-4
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: November 5, 1990

ATTACHMENT TO LICENSE AMENDMENT NO. 147

FACILITY OPERATING LICENSE NO. DPR-68

DOCKET NO. 50-296

Revise the Appendix A Technical Specifications by removing the pages identified below and inserting the enclosed pages. The revised pages are identified by the captioned amendment number and contain marginal lines indicating the area of change. Overleaf pages* are provided to maintain document completeness.

REMOVE	INSERT
3.5/4.5-9	3.5/4.5-9
3.5/4.5-10	3.5/4.5-10*
3.5/4.5-11	3.5/4.5-11
3.5/4.5-11a	3.5/4.5-11a*
3.5/4.5-29	3.5/4.5-29
3.5/4.5-30	3.5/4.5-30

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.5.C RHR Service Water and Emergency Equipment Cooling Water Systems (EECWS) 1. PRIOR TO STARTUP from a COLD SHUTDOWN CONDITION, the RHRSW pumps, including pump B1 or B2, shall be OPERABLE and assigned to service as indicated in Table 3.5-1.	4.5.C RHR Service Water and Emergency Equipment Cooling Water Systems (EECWS) 1. a. Each of the RHRSW pumps normally assigned to automatic service on the EECW headers will be tested automatically each time the diesel generators are tested. Each of the RHRSW pumps and all associated essential control valves for the EECW headers and RHR heat exchanger headers shall be demonstrated to be OPERABLE in accordance with Specification 1.0.MM. b. Annually each RHRSW pump shall be flow-rate tested. To be considered OPERABLE, each pump shall pump at least 4500 gpm through its normally assigned flow path. c. Monthly verify that each valve (manual, power-operated, or automatic) in the flowpath servicing safety-related equipment in the affected unit that is not locked, sealed, or otherwise secured in position, is in its correct position.

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.5.C RHR Service Water and Emergency Equipment Cooling Water Systems (EECWS) (Continued)	4.5.C RHR Service Water and Emergency Equipment Cooling Water Systems (EECWS) (Continued)
2. During REACTOR POWER OPERATION, RHRSW pumps must be OPERABLE and assigned to service as indicated in Table 3.5-1 for the specified time limits.	2. No additional surveillance is required.
3. During REACTOR POWER OPERATION, both RHRSW pumps B1 and B2 normally or alternately assigned to the RHR heat exchanger header supplying the standby coolant supply connection must be OPERABLE except as specified in 3.5.C.4 and 3.5.C.5 below.	3. Routine surveillance for these pumps is specified in 4.5.C.1.

Table 3.5-1

Minimum RHRSW and EECW Pump Assignment

Time Limit	1 Unit Fueled (2 Units Defueled)			2 Units Fueled (1 Unit Defueled)			3 Units Fueled		
	RHRSW		EECW(A)	RHRSW		EECW(A)	RHRSW		EECW(A)
None	4	and	3	5	and	3	7	and	3
30 Days	3	and	2	5 (or) 4	and and	2 3	7 (or) 6	and and	2 3
7 Days	2	and	2	4	and	2	6	and	2

Note:

(A) At least one OPERABLE pump must be assigned to each header. Only automatically starting pumps may be assigned to EECW header service.

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The suppression chamber can be drained when the reactor vessel pressure is atmospheric, irradiated fuel is in the reactor vessel, and work is not in progress which has the potential to drain the vessel. By requiring the fuel pool gate to be open with the vessel head removed, the combined water inventory in the fuel pool, the reactor cavity, and the separator/dryer pool, between the fuel pool low level alarm and the reactor vessel flange, is about 65,800 cubic feet (492,000 gallons). This will provide adequate low-pressure cooling in lieu of CSS and RHR (LPCI and containment cooling mode) as currently required in Specifications 3.5.A.4 and 3.5.B.9. The additional requirements for providing standby coolant supply available will ensure a redundant supply of coolant supply. Control rod drive maintenance may continue during this period provided no more than one drive is removed at a time unless blind flanges are installed during the period of time CRDs are not in place.

Should the capability for providing flow through the cross-connect lines be lost, a 10-day repair time is allowed before shutdown is required. This repair time is justified based on the very small probability for ever needing RHR pumps and heat exchangers to supply an adjacent unit.

REFERENCES

1. Residual Heat Removal System (BFNP FSAR subsection 4.8)

2. Core Standby Cooling Systems (BFNP FSAR Section 6)

3.5.C. RHR Service Water System and Emergency Equipment Cooling Water System (EECWS)

The EECW has two completely redundant and independent headers (north and south) in a loop arrangement inside and outside the Reactor Building. Four RHRSW pumps, two per header, (A3, B3, C3 and D3) are dedicated to automatically supplying the EECW system needs. Four additional pumps (A1, B1, C1 and D1) can serve as RHRSW system pumps or be manually valved into the EECW system headers and serve as backup for the RHRSW pumps dedicated to supplying the EECW system. Those components requiring EECW, except the control air compressors which are not safety related, are able to be fed from both headers thus assuring continuity of operation if either header becomes inoperable. The control air compressors only use the EECW north header as an emergency backup supply.

There are four RHR heat exchanger headers (A, B, C, & D) with one RHR heat exchanger from each unit on each header. There are two RHRSW pumps on each header; one normally assigned to each header (A2, B2, C2, or D2) and one on alternate assignment (A1, B1, C1, or D1). One RHR heat exchanger header can adequately deliver the flow supplied by both RHRSW pumps to any two of the three RHR heat exchangers on the header. One RHRSW pump can supply the full flow requirement of one RHR heat exchanger. Two RHR heat exchangers can more than adequately handle the cooling requirements of one unit in any abnormal or postaccident situation.

The RHR Service Water System was designed as a shared system for three units. The specification, as written, is conservative when consideration is given to particular pumps being out of service and to possible valving arrangements. If unusual operating conditions arise such that more pumps are out of service than allowed by this specification, a special case request may be made to the NRC to allow continued operation if the actual system cooling requirements can be assured.

Should one of the two RHRSW pumps normally or alternately assigned to the RHR heat exchanger header supplying the standby coolant supply connection become inoperable, an equal capability for long-term fluid makeup to the unit reactor and for cooling of the unit containment remains OPERABLE. Because of the availability of an equal makeup and cooling capability, a 30-day repair period is justified. Should the capability to provide standby coolant supply be lost, a 10-day repair time is justified based on the low probability for ever needing the standby coolant supply. Verification that the LPCI subsystem cross-tie valve is closed and power to its operator is disconnected ensures that each LPCI subsystem remains independent and a failure of the flow path in one subsystem will not affect the flow path of the other LPCI subsystem.

With only one unit fueled, four RHRSW pumps are required to be OPERABLE for indefinite operation to meet the requirements of Specification 3.5.B.1 (RHR system). If only three RHRSW pumps are OPERABLE, a 30-day LCO exists because of the requirement of Specification 3.5.B.5 (RHR system).

3.5.D Equipment Area Coolers

There is an equipment area cooler for each RHR pump and an equipment area cooler for each set (two pumps, either the A and C or B and D pumps) of core spray pumps. The equipment area coolers take suction near the cooling air discharge of the motor of the pump(s) served and discharge air near the cooling air suction of the motor of the pump(s) served. This ensures that cool air is supplied for cooling the pump motors.

The equipment area coolers also remove the pump, and equipment waste heat from the basement rooms housing the engineered safeguard equipment. The various conditions under which the operation of the equipment air coolers is required have been identified by evaluating the normal and abnormal operating transients and accidents over the full range of planned operations. The surveillance and testing of the equipment area coolers in each of their various modes is accomplished during the testing of the equipment served by these coolers. This testing is adequate to assure the OPERABILITY of the equipment area coolers.

REFERENCES

1. Residual Heat Removal System (BFN FSAR Section 4.8)

2. Core Standby Cooling System (BFN FSAR subsection 6.7)

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

ENCLOSURE 4

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 176 TO FACILITY OPERATING LICENSE NO. DPR-33

AMENDMENT NO. 179 TO FACILITY OPERATING LICENSE NO. DPR-52

AMENDMENT NO. 147 TO FACILITY OPERATING LICENSE NO. DPR-68

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2 AND 3

DOCKET NOS. 50-259, 50-260 AND 50-296

1.0 INTRODUCTION

By letter dated May 18, 1990, the Tennessee Valley Authority requested an amendment to licenses DPR-33, DPR-52 and DPR-68 to change Browns Ferry Nuclear Plant, Units 1, 2 and 3 Technical Specifications (TS). These changes were requested pursuant to the provisions of 10 CFR 50.4 and 50.90. This amendment was proposed inorder to clarify the TS requirements for limiting conditions for operation (LCO) of the Residual Heat Removal Service Water (RHRSW) and Emergency Equipment Cooling Water (EECW) systems.

The RHRSW system provides cooling water from the ultimate heat sink (Wheeler Reservoir) to remove reactor core heat via the RHR heat exchangers. The RHRSW also serves as the standby coolant supply (SBCS) and can supply makeup to the reactor coolant system when all emergency core cooling systems have failed. The RHRSW system consists of eight motor-driven service water pumps (four pairs) that take a suction through strainers in the intake structure and supply four headers that serve the RHR heat exchangers for all three Browns Ferry units.

The EECW system provides cooling water from the ultimate heat sink to various component heat loads in the plant, including the diesel generator heat exchanger, RHR and Core Spray System (CSS) pump room coolers, RHR pump seal coolers, and various other heat loads. The EECW system also serves as a backup for the raw cooling water (RCW) system which is the normal water source for some operating systems including the reactor building closed cooling water (RBCCW) system. The EECW system consists of four, automatically starting, motor-driven service water pumps that take a suction through strainers in the intake structure and supply two headers (north header and south header) which serve all three Browns Ferry units. Cooling water is returned to the ultimate heat sink via a yard drainage system.

Description of the Changes to BFN Technical Specifications for Units 1, 2 and 3

1. Revise LCO 3.5.C.1

Existing LCO 3.5.C.1 reads:

1. PRIOR TO STARTUP from a COLD CONDITION, 9 RHRSW pumps must be OPERABLE, with 7 pumps . . ., assigned to RHRSW service and two automatically starting pumps assigned to EECW service.

Change to LCO 3.5.C.1 reads:

1. PRIOR TO STARTUP from a COLD SHUTDOWN CONDITION, the RHRSW pumps, . . ., shall be OPERABLE and assigned to service as indicated in Table 3.5-1.

2. Table 3.5-1, "Minimum RHRSW and EECW Pump Assignment" has been reformatted as follows: A title has been included on the table, separate columns for the minimum number of RHRSW and EECW pumps required to be operable based on the number of fueled units, and notes made unnecessary as a consequence of the reformatting, have been deleted.

3. The Bases Section 3.5.C for RHRSW and EECW are revised as follows:

   a. The Bases for EECW are replaced by - "The EECW has two completely independent headers (north and south) in a loop arrangement inside and outside the Reactor Building. Each header is supplied by two automatic RHRSW pumps. A crosstie at the RHRSW pump discharge provides the capability for each header to be supplied by four automatically starting RHRSW pumps. Those components requiring EECW, except the control air compressors which are not safety related, are able to be fed from both headers thus assuring continuity of operation if either header becomes inoperable. The air compressors only use EECW as an emergency backup supply."

   b. A correction is being made to the "RHRSW" bases for Units 1 and 2 only to change "RHRSW" heat exchanger to "RHR" heat exchanger.

   c. The following is added to the bases: "With only one unit fueled, four RHRSW pumps are required to be OPERABLE for indefinite operation to meet the requirements of specification 3.5.B.1 (RHR System). If only three RHRSW pumps are OPERABLE, a 30 days LCO exists because of the requirement of Specification 3.5.B.5 (RHR System)."

2.0 EVALUATION

TVA has clarified and simplified Table 3.5-1, "Minimum RHRSW and EECW Pump Assignment." The minimum pump assignment is a function of the number of units fueled. When the number of operable pumps is less than the assigned minimum, the specified LCO becomes effective which requires that the number of operable service water pumps must be brought back up to the minimum, within a certain time frame, if plant operation is to continune. The TS prescribe two different time limits which become effective whenever the number of assigned and/or operable pumps fall below the minimum number needed for indefinite operation. Plant operation with the number of assigned, operable pumps below the minimum for indefinite operation is allowed for either 30 days or sever days, depending on the actual number of pumps available and operational status of the Browns Ferry units. TVA's amendment does not affect existing LCO or surveillance requirements, it is intended to make the TS more user friendly for the operators and to eliminate a potential conflict with the RHR LCO requirements.

TVA has reformatted TS Table 3.5-1 and reduced the number of notes from four to just one. The previous Table 3.5-1 format and associated footnotes were sufficiently complex to impede comprehension and contribute to potential misapplication by reactor operators. The remaining note listed below revised Table 3.5-1 pertains to the EECW system. This note states that at least one operable pump must be assigned to each EECW header; and only the automatically starting pumps may be assigned to EECW header service. Since there are two headers for EECW serving all three units, one north header and one south header, the minimum allowable operable pumps for reduced time limits is two EECW pumps. The EECW system normally is in standby, with pumps A3, B3, C3, and D3 aligned to supply the EECW headers when required. Two pumps are aligned to each header. The maximum EECW flow rate required by the three unit plant is 9800 gpm, including non-safety systems requiring 4400 gpm for the RBCCW System air compressors cooler, control room air conditioning chillers and hydrogen/oxygen analyzer. Three of the four EECW pumps are necessary to supply this maximum flow rate; two EECW pumps can supply the essential plant loads. The staff concludes that the minimum EECW pump assignments of TS Table 3.5.1 are acceptable.

The RHRSW system normally is in standby, with two pumps aligned to each of four RHRSW headers which serve the RHR heat exchangers for three units. No cross-connections exist between the four RHRSW headers, but there are cross-connections between the pumps that are aligned to the RHRSW system and the service water pumps aligned to the EECW system. The cooling water requirements of each RHR heat exchanger can be supplied by one RHRSW pump. TS Table 3.5-1 specifies, in a clear concise format, the operability requirements of the RHRSW pumps, depending upon unit status. The staff finds that the minimum RHRSW pump assignments of Table 3.5-1 are acceptable.

3.0 ENVIRONMENTAL CONSIDERATION

The amendments involve a change to a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure.

The Commission has previously issued a proposed finding that these amendments involve no significant hazards consideration and there has been no public comment on such finding. Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement nor environmental assessment need be prepared in connection with the issuance of these amendments.

4.0 CONCLUSION

The staff has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security nor to the health and safety of the public.

Principal Contributor: D. H. Moran

Dated: November 5, 1990